Serious games & EMERGO

sustainable development of skill-based serious games

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Centre for Learning Sciences and Technologies
celstec.org

Agenda Workshop Serious games & EMERGO

10:45 – 10:50 Welcome + getting to know each other

10:50 – 11:15 Task 1 - Evaluation of serious games

11:15 – 11:25 (Serious) games-characteristics and motives(Rob)

11:25 – 11:45 Task 2 – experiencing CSI Heerlen

11:45 - 11:55 Developing EMERGO games (Rob)

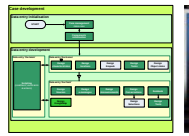
11:55 – 12:10 Skill-based EMERGO game Sexology (Aad)

12:10 – 12:15 Final discussion and round off (Rob)

Note: Slides will be available after the workshop

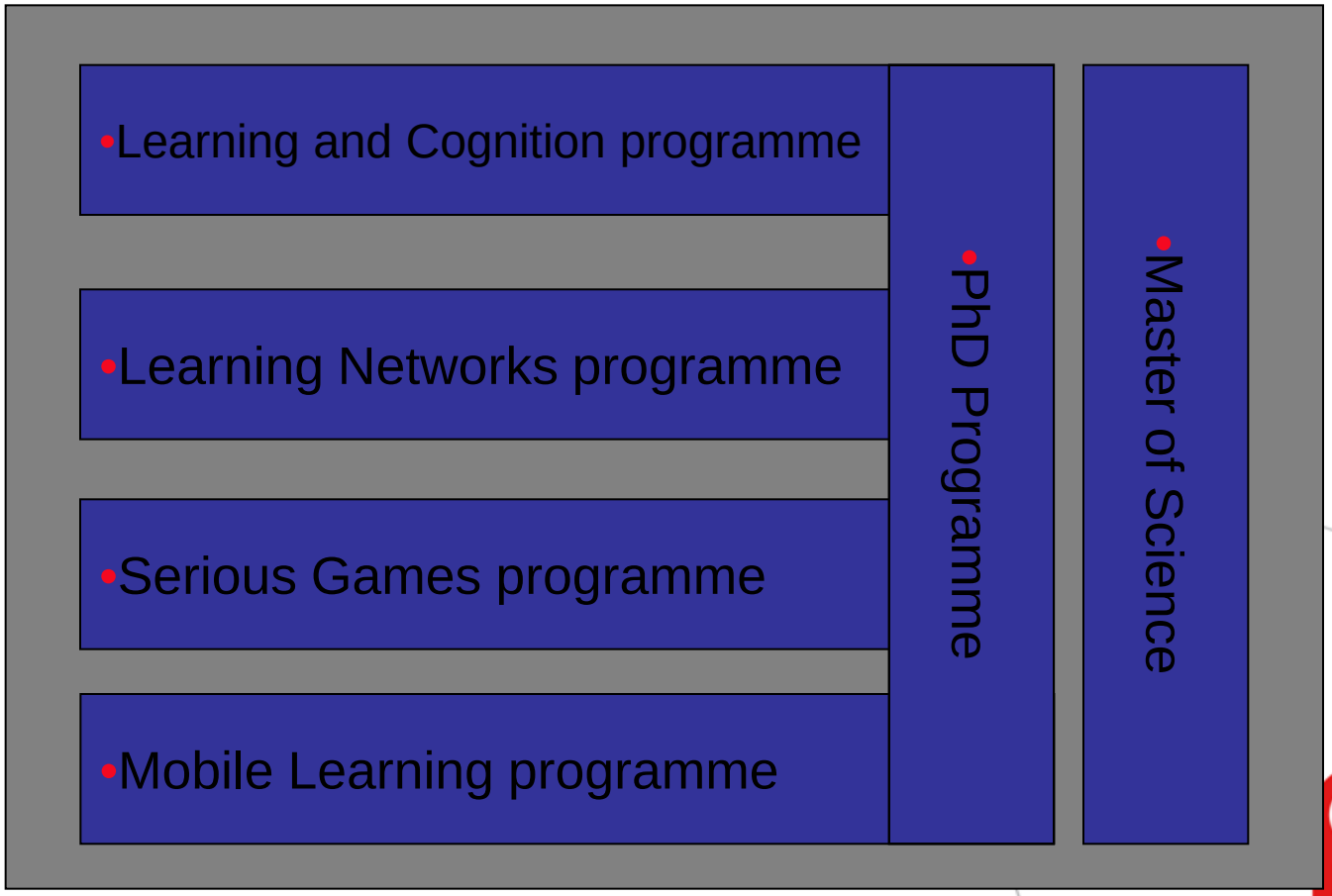






CELSTEC programmes



Serious Games Programme

(Wim Westera)

1. Research tools & methods
2. Development cases
3. Education

Serious Games Programme

On going research, cases and education:

SG development EMERGO toolkit & methodology + EMERGO product (all)

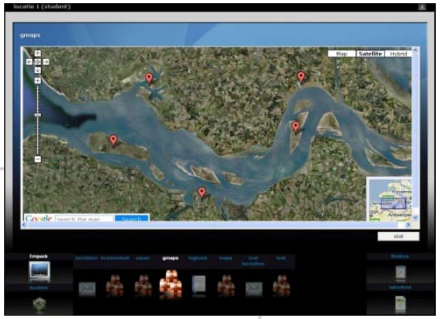
Collaborative Scripting Games (Hans)

StreetLearn/ARLearn (Google StreetView) (Roland, Stefaan)

Language Technologies, chatbot: Luctor (Peter – Bachelor stage)

Wiki games (Peter)

Sensors: Game-based Communication Skills (Kiavash – PhD)



Game Learning Patterns (Sebastian – PhD)

Case: Thermenmuseum (Unity) (Wen, Wim)

Case: CHERMUG (research methods) (Peter)

GALA (Network of Excellence) (Wim, Rob)

- e.g. serious gaming & assessment

SG Topic (Wim, Rob, Roland, Peter)

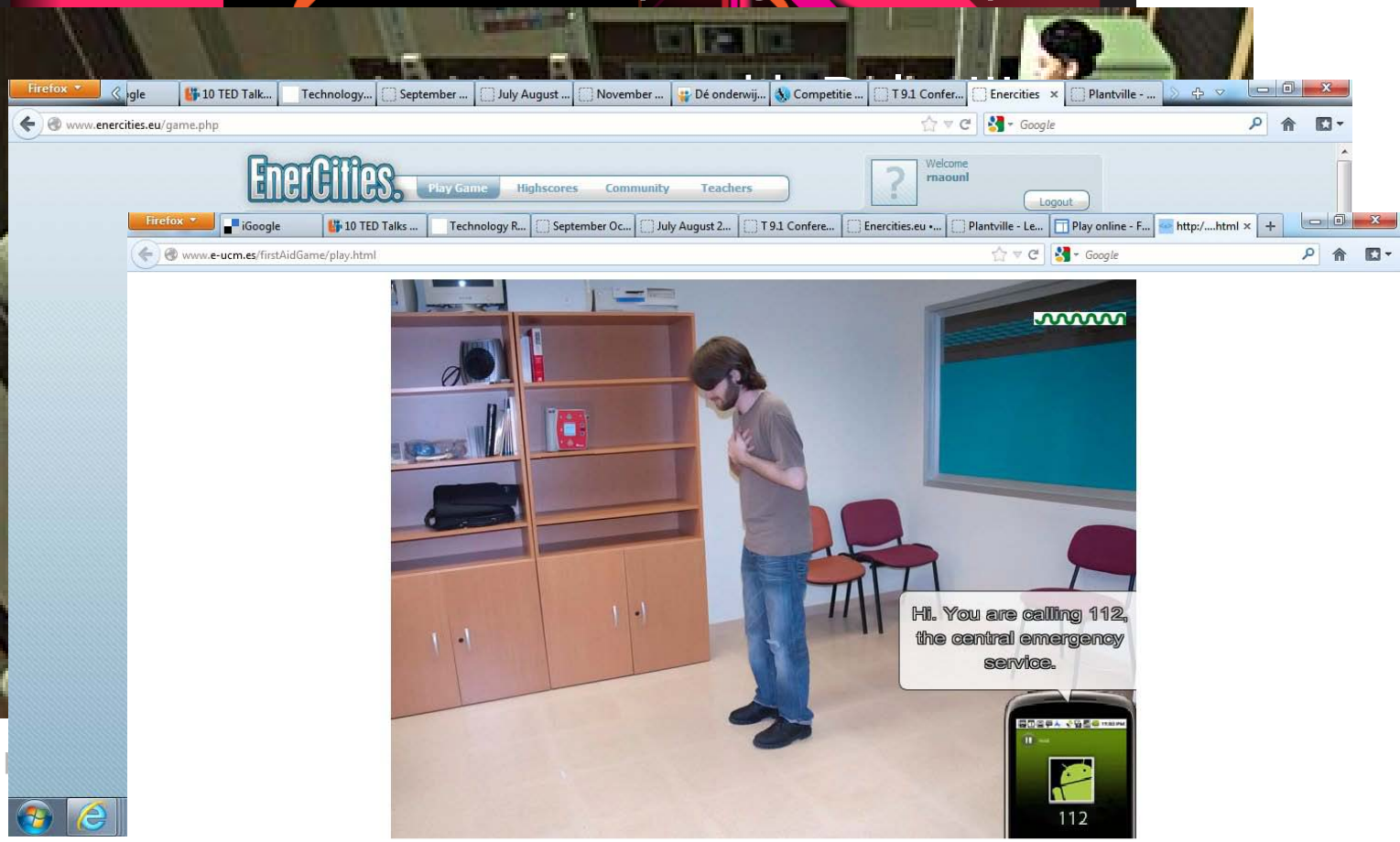
Course Digital media and learning (Dutch) (Rob)

GALA
Games and Learning Alliance
Network of Excellence for Serious Games

with EMERGO

with Flash

(the great flue)



Workshop SGs

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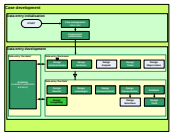
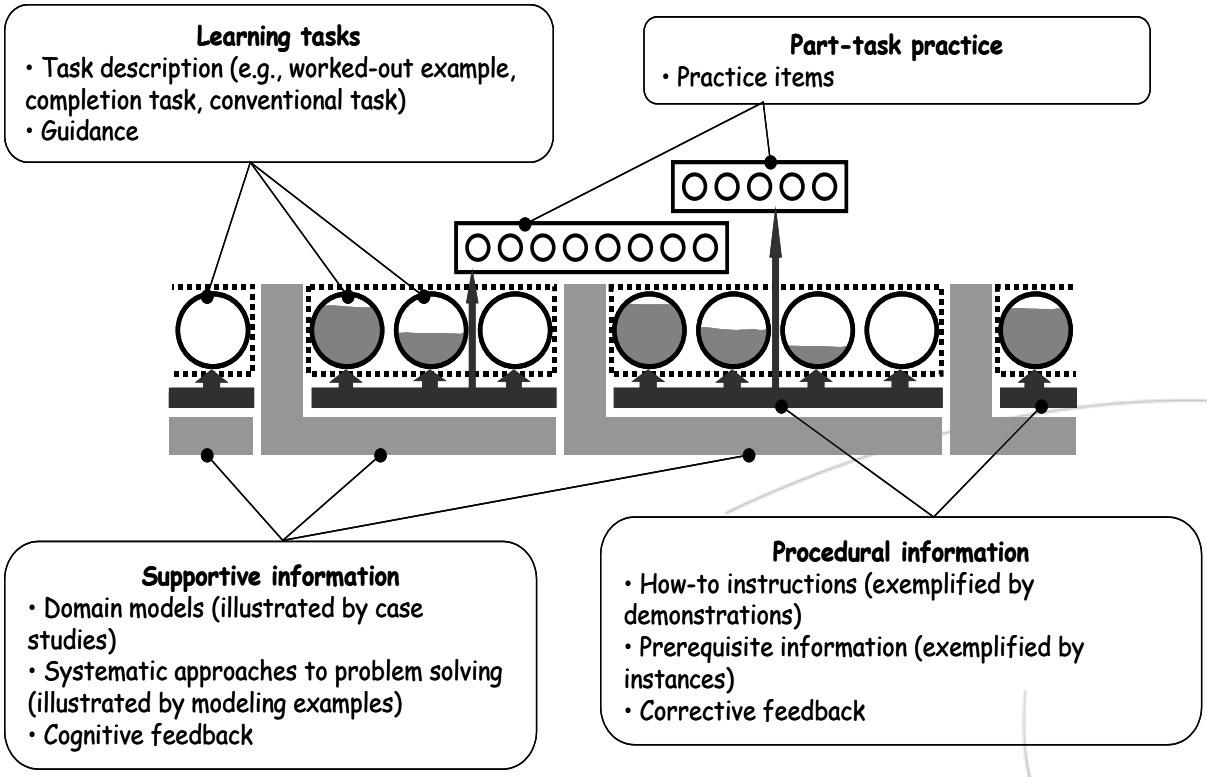




Task 1 Evaluate an existing Serious Game

1. Enercities (www.enercities.eu)
2. First aid (http://first-aid-game.e-ucm.es)

(use Evaluation form – ***Serious Game & 4C – ID model*** as guideline)



Task 1 Evaluate an existing Serious Game

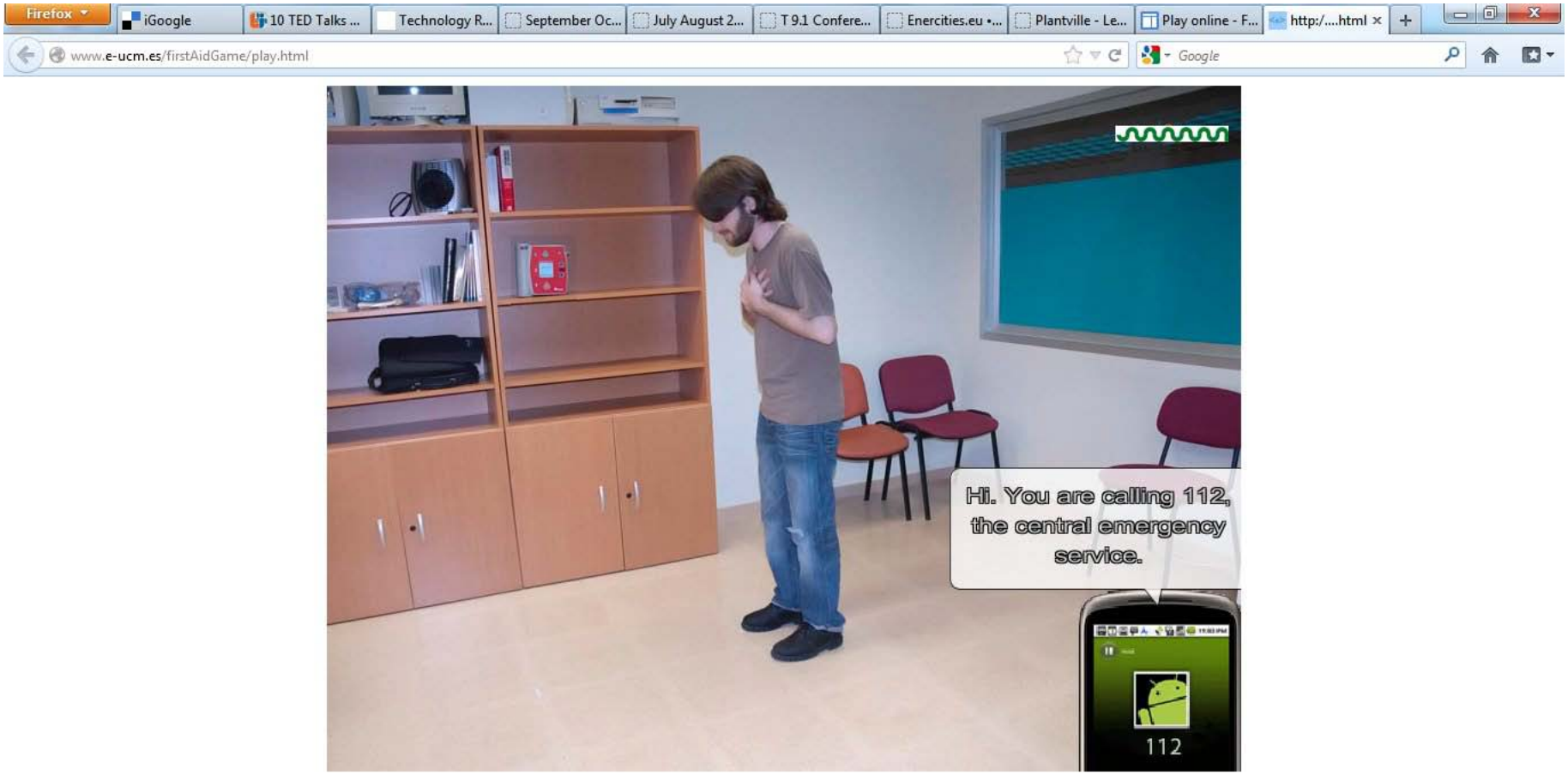
1. Enercities (www.enercities.eu)

- Build your own sustainable city

Task 1 Evaluate an existing Serious Game

2. First aid (http://first-aid-game.e-ucm.es)

- Provide first aid



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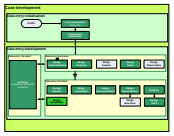


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Setting the scene

Confucius (500 bC)

“Tell me and I will forget,

Show me and I may remember,

Involve me and I will understand ...“

Einstein (nd) *”Games are the most elevated form of investigation”*

Why Serious games?

- human species is a player by nature (childs, adults) ‘hardwired’
- immersive learning experiences
  (experimenting, solving problems, creativity, strategical thinking)
- safe experimentation
- connection between theory and practice
- natural feedback (within stories)
- adaptivity
- social connectivity (Self Determination Theory = SDT)
- increased motivation & perseverance: - player is in control (SDT)
  - meaningful/relevance (SDT)
- raised expectations (due to success of the gaming industry)
- improved learning? (limited support from RCT-research)
- digital natives? (all ages, both genders)

Number of papers providing empirical evidence for each learning and behavioural outcome

Connolly, Boyle, Hainey, & Boyle (2012)

Outcomes of playing games	Total
Affective and motivational outcomes	18
Knowledge acquisition/content understanding	17
Perceptual and cognitive skills	13
Behaviour change	8
Physiological outcomes	6
Social/soft skill outcomes	4
Motor skills	4
Grand Total (out of 7,392 papers)	70

(Serious) games: characteristics

"a game is a **system** in which **players** engage in an **abstract challenge**, defined by **rules**, **interactivity** and **feedback**, that results in a **quantifiable outcome** often eliciting an **emotional reaction**" (Koster, 2005; Kapp, 2012)

- **system**
- **players (= learners in game-based learning)**
- **abstract challenge**
- **rules**
- **interactivity**
- **feedback**
- **quantifiable outcome (goal-learning objective)**
- **emotional reaction**

Serious games: purposes and considerations

“a serious game is a game with another purpose than pure entertainment”

Purposes

- learning
- behaviour change (e.g, health, energy consumption)
- explore future scenario’s
- business processes (‘gamification of business’)
- marketing

Considerations

- balance play-learn-meaning (realism) for effectiveness & efficiency
- competition between learners?
- learning objectives (which?) & assessment (how?)
- costs & expertise & technology (design, development, exploitation)

Genres of Serious games for learning (Alldrich, 2005)

1. virtual worlds – role playing/social network games (World of Warcraft)
2. branching stories[strategy/adventure](SharkWorld, FirstAid, Emergo games)
3. simulations/spreadsheets (Enercity, SimCity,Great Flu, Darfur is Dying)
4. virtual labs and virtual products (Flight Simulator)
5. COTS (Commercial Of The Self) (Monopoly,Wheel of Fortune)
6. cross genre (mix of genres 1 up till 5)

Genre-suitability for Learning Objectives

Knowledge – Insight: 2, 4, 5

Skills: 1, 2, 3, 4 → skill-based Serious Games (SGs)

Attitudes: 1

Skill-based Serious games: characteristics

Experiencing emotions and reasoning in Authentic tasks

Active and interactive participation

Develop conceptual understanding (practicing: models-simulations)

Ability to perform scientific inquiry

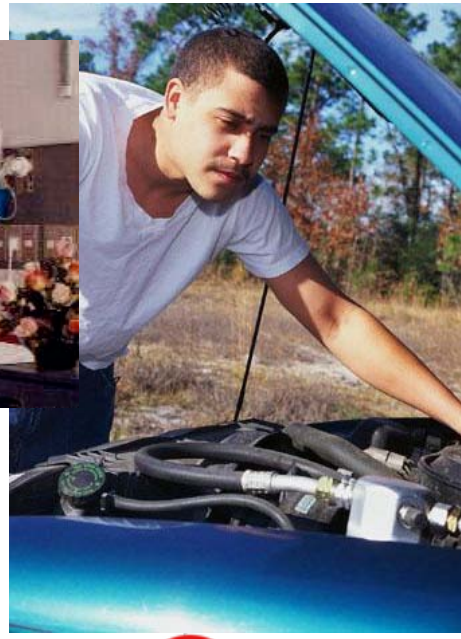
Develop understanding about inquiry (reflection + natural feedback)

Solving authentic problems

All about: Authenticity - suspension of disbelief - motivation

Authentic tasks

= realistic problem situations, where learners participate as actor and constantly are being confronted with the consequences of their actions when applying knowledge and skills in finding solutions



Discussion - ?questions?

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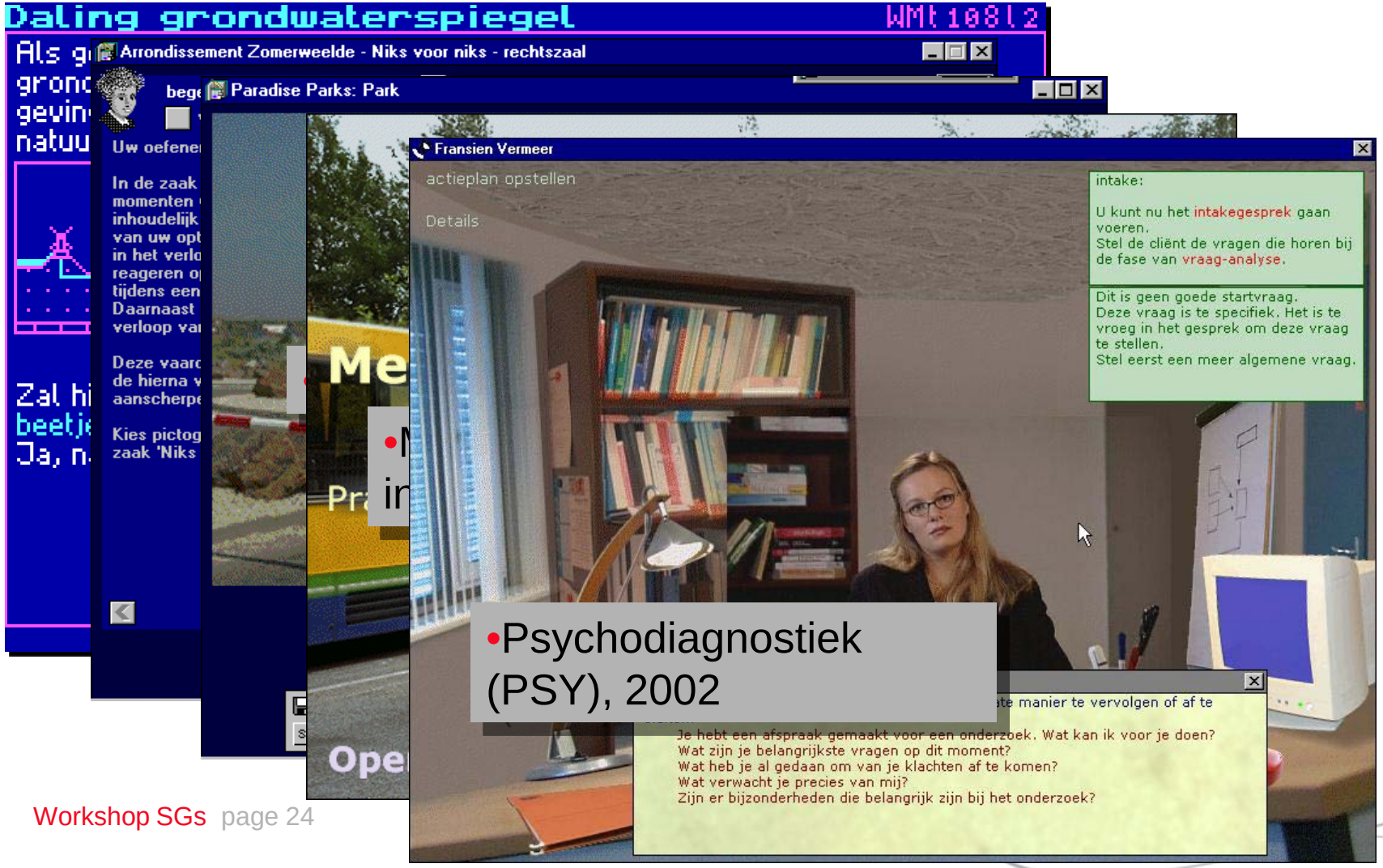
Simulations/courseware at the Open University



- Psychodiagnostiek (PSY), 2002

EMERGO games - examples

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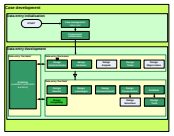


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Task 2 - Experience EMERGO demonstrator CSI Heerlen

http://emergo.ou.nl/emergo/community/demonstrators.htm (CSI engels)

CSI Heerlen illustrates template “logic reasoning and truth detection”

- single-user
- unexpected events
- time constraints
- score (compared to other players)

Demo of CSI

Don’t take this too serious!

(it is not about learning, but about playing)

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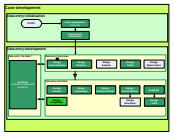


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Problems in training programs like Water Management

Premise: Acquiring complex skills requires intensive learner support

1. Teacher-bandwidth problem → delay, skill gaps

2. Constraints (locations, time, # actors)→ “less rich” learning affordances

3. Current solutions (field trips or practicals) → not sustainable training

So: suboptimal training

Solution: high-quality and sustainable skill-based SGs for Water Management
To achieve goal: Improve study success and quality of training



Problems in training programs like Sexology

Premise: Acquiring complex skills requires intensive learner support

1. Ethical constraints for safe experimentation in real situations

2. Teacher-bandwidth problem → delay, skill gaps

3. Constraints (# clients, time)→ “less rich” learning affordances

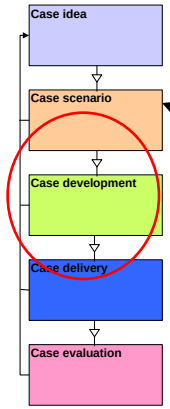
4. Current solutions (internships) → not sustainable training

So: suboptimal training

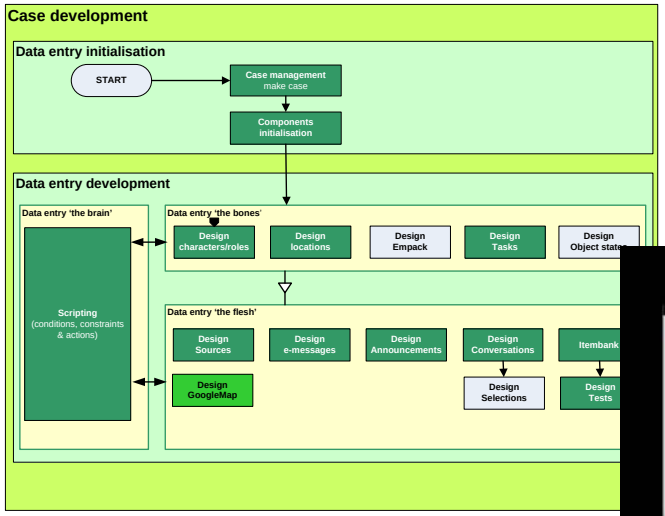
Solution: high-quality and sustainable skill-based SGs for Sexology
To achieve goal: Improve study success and quality of training

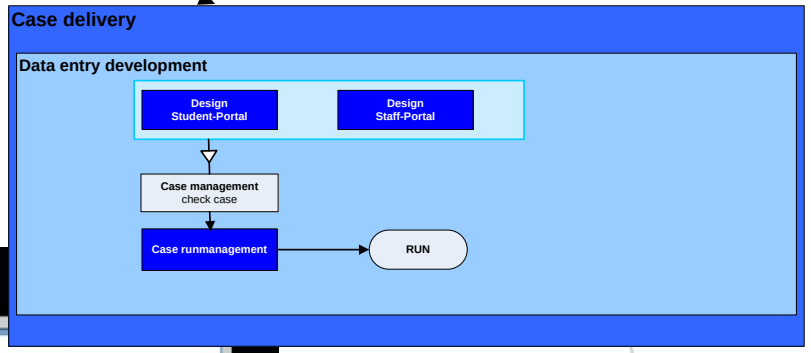
Solution

Skill-based SGs [& professionalisation] (EMERGO)



- Method for developing Skill-based SGs (cases) (key characteristic: authentic tasks)
- Components for data entry detailed scenario (development)
- Player for testing (development) and delivery
- Components for serious games delivery (delivery)





Solution = EMERGO-game

Evaluation of skill-based SGs Water Management

Conclusion:

*Skill-based SGs with EMERGO **can** tackle the teacher-bandwidth problem*

1. Better learning results and more satisfied learners

2. Reduction of teacher support time and less overhead

3. Flexible – reusable – and easy to maintain
   - case library : separation tasks and sources → in different case structures/flow
   - case templates (e.g., negotiation, truth gathering, market place)

However:

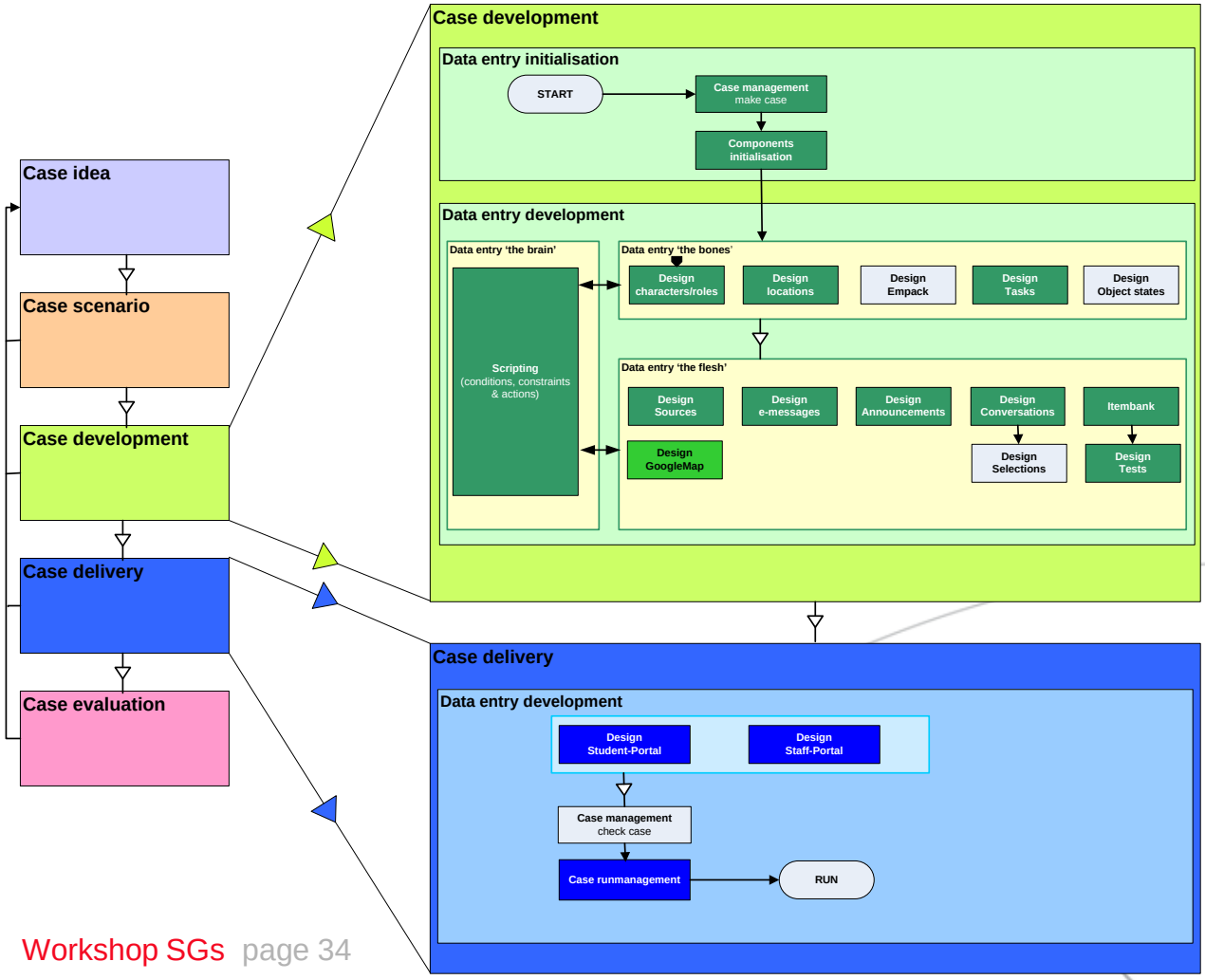
Comparison skill-based SG with existing training can be challenging

Requirements for skill-based SGs - recommendations

- Decisionmakers see SGs as a solution for training-problems (obvious)
- Teachers who want to use skill-based SGs (obvious)
- (preferably) rough material/resources as a start for SG content
- EMERGO method, -toolkit and player (free available)
- Professionalisation authors/teachers with EMERGO(Website, workshops)
- Technical infrastructure EMERGO (data entry + player)
- Multidisciplinairy team (content, pedagogy, audiovisual, technical)
- (preferably) involve learners during SG development (and testing)
- Money (20k€ to 500 k€)

OR: give us your SG content–we create YOUR EMERGO game

EMERGO methodology & toolkit



Serious games: HOW – design guidelines (Shute & Ke, 2012)

Interactive problem solving (ongoing interaction player-game)

Specific goals & rules → help players' focus on what to do and when

Adaptive challenges (hover at the boundary of student's ability)

[zone of proximal development & flow (Vygotsky, 1978;Csikszentmihalyi, 1990)]

Control for the player (allow or encourage players' influence)

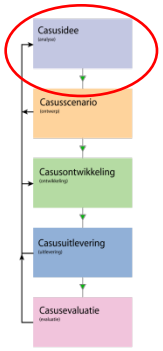
Ongoing feedback (timely information about performance)

Uncertainty (evokes suspense and player engagement)

Sensory stimuli (storyline and graphics/sounds to excite senses)

[professional graphics/sounds are NOT required]

Case idea



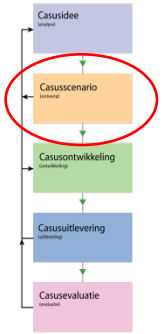
Waddenzee →
('running example')

	A25: Various design measures will be taken to warrant sufficient interest and motivation, including identification with the student role (junior) and responsibility (helping others, being supported and assessed by coach), gaining knowledge that is highly authentic and implicit, having rich resources available that make the course lively, introducing interactivity and gaming elements (like unexpected, real-life events) that raise the awareness of actually being involved, awareness of presence of other students (overview of their progress and results)
	Q26: What unforeseen circumstances are incorporated? A26: Unforeseen circumstances still have to be worked out but can for instance be that an expert has ran out of time for consultation, that parameters used in a prior report now seem to have become outdated, political change, new report, et cetera
	Q27: Is competition incorporated? How do students get rewarded for excellent performance or behaviour? A27: No, currently it is only envisioned that students can see each others progress. They will not be rewarded or punished for their ranking. The teacher might ask students to compare their report with that from another.
Students' progress	Q28: How do students discover not yet having acquired the main complex cognitive skill? A28: The task list provides an overview of tasks to be carried out for each case, including an estimation of time for each task. So time wise they can monitor amount of study time passed and ahead. To assess progress on each step (usually a collection of some tasks) students will be provided automated feedback (provided by coach, or by partial worked out examples). Each report has to be accepted by the teacher.
	Q29: How can students monitor their progress? A29: Ibid. The task list provides an overview of tasks to be carried out for each case, including an estimation of time for each task. So time wise they can monitor amount of study time passed and ahead. To assess progress on each step (usually a collection of some tasks) students will be provided automated feedback (provided by coach, or by partial worked out examples). Each report has to be accepted by the teacher. Furthermore, they can compare their progress with that of their peers.
	Q30: How is it checked if students have acquired the main complex cognitive skill? A30: Students select appropriate methods and models from a (gross) list. Teacher will take this into account when assessing the final reports send in. There is a list of assessment criteria available, focusing on content but also structure, source annotation, use of language, etc. Furthermore we have (good and bad) worked out examples of reports available for comparison
	Q31: Is summative assessment included and are its results used in formative assessment?

	a step-wise research (or excursion e.g.) approach. Students are free to adapt or ignore the structured stepwise way to finish the three tasks.
	Q21: What kind of cooperation is needed by students? A21: In the learning process there will be no obliged contact between students, it is an individual trajectory. The input of self-defined new sources as an update to the case knowledge base by students is encouraged. **Note:** *this will have to be different for skills labs cases where cooperation is an explicit competence defined in the project plan*
	Q22: Do students have different case characters? A22: We do not know yet in which 'real life' setting (an excursion, a research assignment or a consultancy advice) the case will take place, but all students will have the same role.
	Q23: Do students have active roles? A23: Students need to take several decisions and need to perform various activities in order to be able to finish a task successfully. This makes them a rather active participant instead of an inactive spectator.
	Q24: Do teachers have active roles? A24: No, the tutor does not have any active role in the case (in exploitation). The tutor assesses the results of the three tasks and provides feedback when needed (the feedback interaction is limited to solving strictly urgent problems). Furthermore we have (good and bad) worked out examples of assignment results available for comparison.
	Q25: What aspects induce and sustain interest and motivation? A25: This depends on the case setting. We do not know yet in which 'real life' setting (an excursion, a research assignment or a consultancy advice) the case will take place.
	Q26: What unforeseen circumstances are incorporated? A26: There will be no unforeseen circumstances build in the case environment. The multi-media sources sources might differ over time: it can for instance be that parameters used in a prior report now seem to have become outdated, political change, new report, et cetera. Because of the natural science nature of most sources this might be a problem of minor relevance. It is important to define a setting in which the political discourse has already finished.
	Q27: Is competition incorporated? How do students get rewarded for excellent performance or behaviour? A27: No, they will not be rewarded or punished for their ranking. The results of the three tasks are a part of the exam of the accompanying distance course.
Students' progress	Q28: How do students discover not yet having acquired the main complex cognitive skill? A28: The steps-list provides an overview of actions to be taken to answer the leading question, including an estimation of time for each task. So, time wise they can monitor the amount of study time passed and ahead. Before they start a task in the case, the student has completed a similar task in the accompanying course (off course on a different subject), with written stepwise guidance and accompanied by (good and bad) worked out examples for comparison.
	Q29: How can students monitor their progress? A29: The three tasks will be assessed by the tutor according to a protocol. The tasks will have fixed times. There is a list of assessment criteria available, focusing on content but also structure, source annotation, use of language, etc. Furthermore we have (good and bad) worked out examples of reports available for comparison.

the Scheldt (during development) ←

Case framework



First step Design - uses case idea (analysis)

= Collection of standard phrases with tools/sources chronologically

→ Input for ingredients scenario (step 2 Design)

waarin de begeleider de student een paper over de Waddenzee stuurt dat afkomstig is van een medewerker van zijn oud-collega, zij willen graag weten wat wij hiervan vinden, kun jij dit eens bekijken en mij je commentaar sturen

waarin de student zijn commentaar op het externe paper naar de begeleider stuurt, en dit opbergt in zijn stage dossier

waarin de begeleider reageert op het ontvangen commentaar

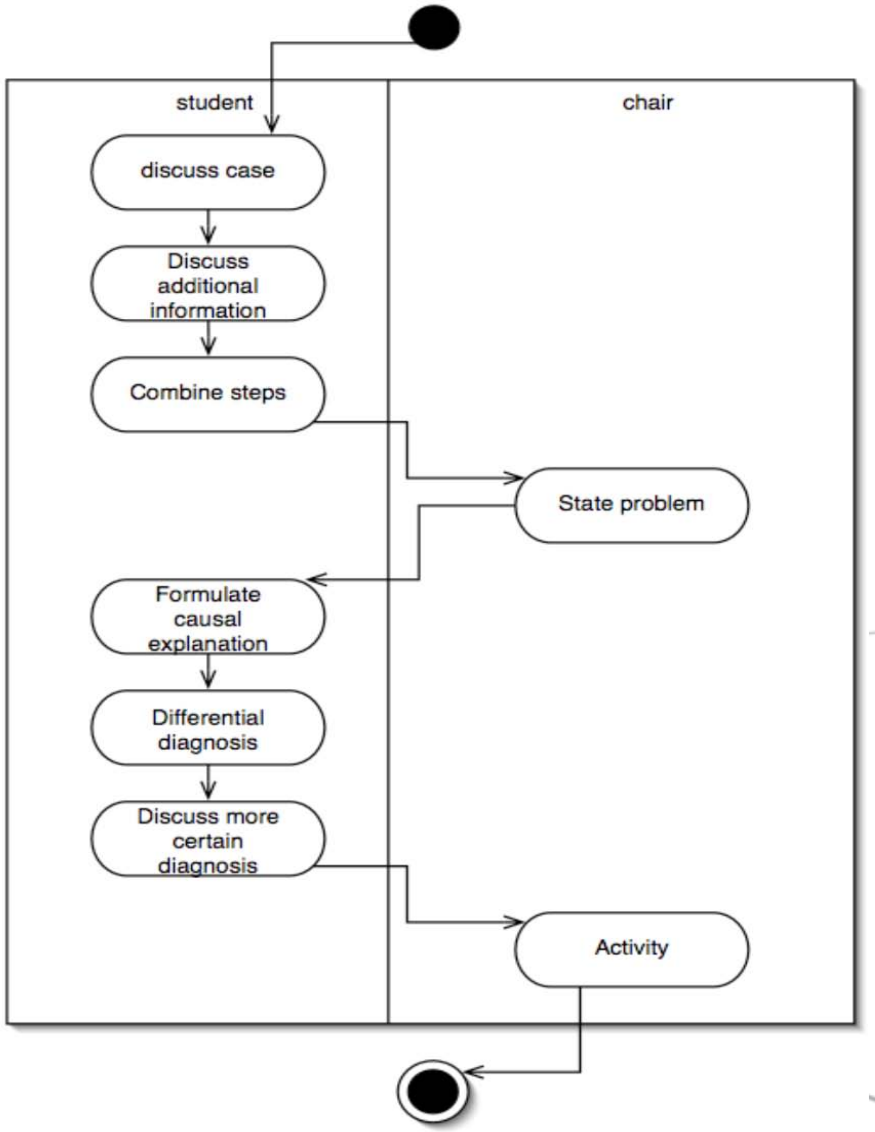
waarin de begeleider de student vraagt, nu de taak is afgerond, eens terug te kijken (reflectie) op de manier waarop de taak is uitgevoerd

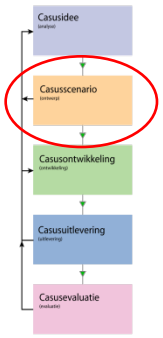
waarin de student zijn eigen handelen samenvat en naar de begeleider stuurt, en opbergt in zijn stage dossier

V

waarin de begeleider bevestigd dat hij het reflectie verslagje heeft ontvangen, maar nu in het buitenland zit en dit later zal bekijken

Case framework: multi-role flowchart





Ingredients scenario

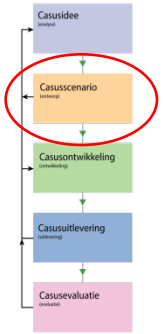
Step 2 of Design - uses framework scenario

For each activity - more detailed description of tools/sources
example: interview questions NPC

→ Input for detail scenario (step 3 of Design)

waarin de begeleider de student informeert over de instelling en de medewerkers

- begeleider vertelt iets over ViBOA
- begeleider vertelt iets over de verschillende kantoorgenoten van stagiaire (*wie zijn dat allemaal?*) maar geeft aan dat de student deze zelf maar aan moeten spreken als hij meer te weten wil komen over hun rol.
- begeleider vertelt student dat naast verplichte activiteiten er een reeks facultatieve activiteiten zijn. Het uitvoeren van deze facultatieve activiteiten levert de student bonuspunten op, die op het eind verzilverd worden. (Bijvoorbeeld in de toetscasus hoeft de student met meer dan ….. bonuspunten bepaalde dingen niet te doen, die studenten met minder bonuspunten wel moeten doen).
- begeleider vertelt dat begeleiding en beoordeling niet in één hand liggen. Een docent van de onderwijsinstelling waar de student op zit, is belast met de beoordeling van de stage
- ……



Detail scenario

Step 3 of Design – uses ingredients scenario

More details for Ingredients - example: complete answers to questions

Graphical representation case flow

→ Input for data-entry(EMERGO-toolkit) & production multimedia assets

[G: Ron ziek thuis] Waarin stagebegeleider vertelt dat Ron ziek thuis is en de begeleiding weer over neemt

[Als student bij stagebegeleider komt en in de afbeelding klikt, vertelt deze het volgende]

<Bestandsnaam; MSJ00112>
[Spreektekst stagebegeleider]
Ik heb vervelend nieuws voor je. Een paar dagen geleden is Ron onderuit gegaan in de badkamer en tegen het bad gevallen. Hij had zich behoorlijk bezeerd en kon niet meer lopen. In het ziekenhuis heeft men geconstateerd dat hij zijn bekken gebroken heeft. Hij heeft toen een broek van gips gekregen en nu zit hij thuis. Je begrijpt dat hij de komende weken niet op het werk kan komen. Erg vervelend voor hem.

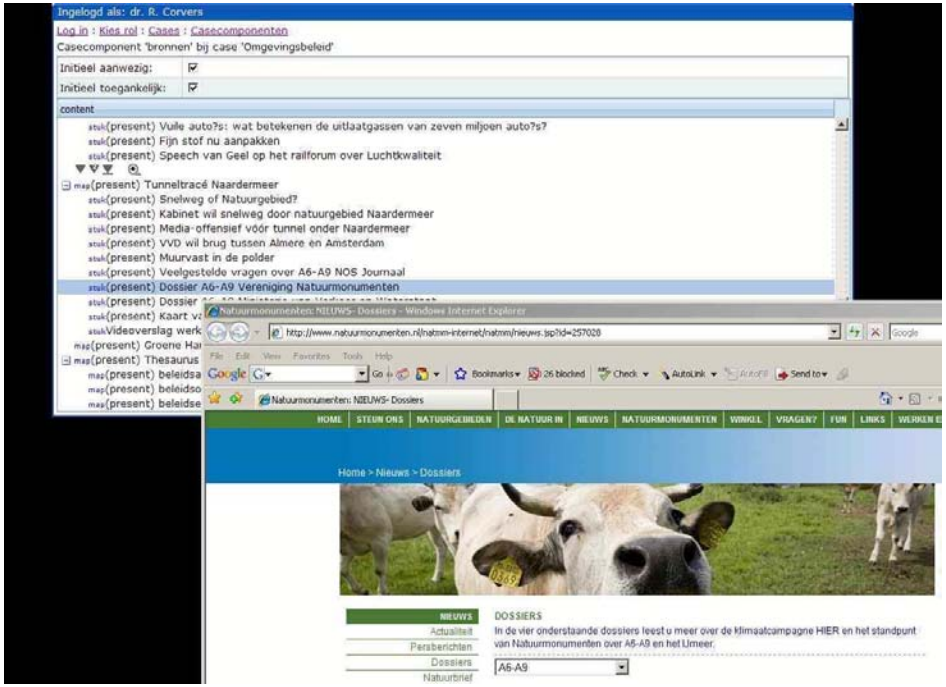
Voor ons betekent dit ik weer de rol van begeleider op me zal nemen. Dat is op zich niet zo'n probleem, alleen ben ik natuurlijk niet zo thuis in het onderwerp als Ron. Ron heeft me gezegd dat hij wel zo goed en zo kwaad als het gaat, wil doorwerken en heeft me gevraagd of ik hem jouw uitwerking van de Waddenzee wil opsturen. Hij heeft toegezegd dat hij een reactie zal geven op je stuk. Maar ik heb geen idee wanneer hij dat doet.

[aansluitend: Als de student een gesprek heeft gehad met Van Dieren]
<Bestandsnaam; MSJ00113>
[Spreektekst stagebegeleider]
Overigens, heeft het gesprek met Wouter van Dieren nog nieuwe inzichten opgeleverd? Of anders gezegd, zou – als je dit gesprek eerder gevoerd had – dat gevolgen gehad hebben voor het stuk dat nu bij Ron ligt? Als dat zo is, zou je kunnen overwegen om hem dit te mailen zodat hij daar nog kennis van kan nemen. Dat hoeft niet hoor, maar het mag natuurlijk wel.

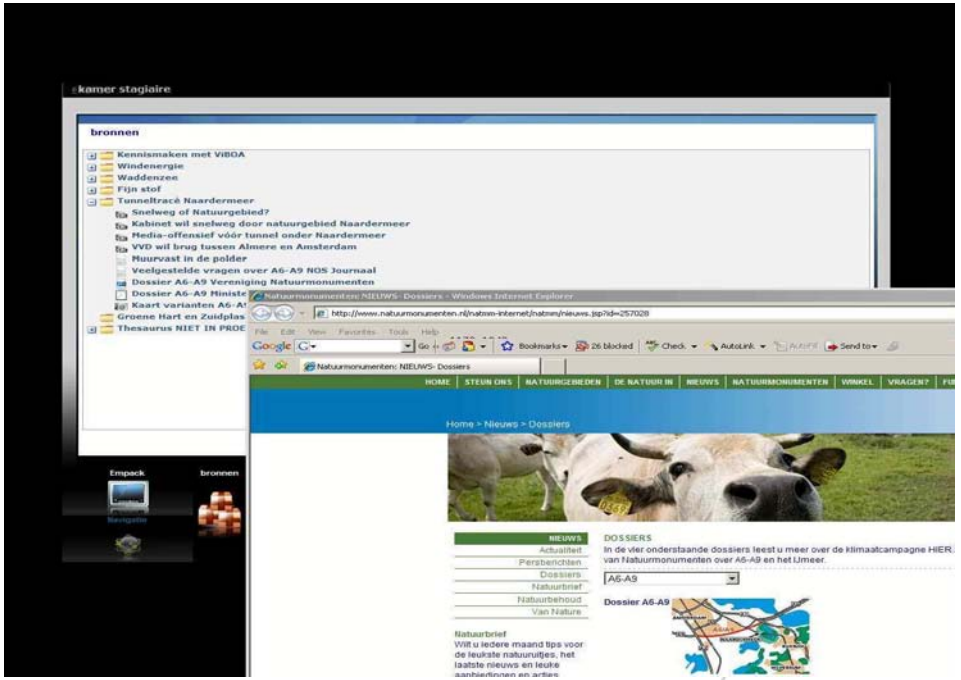
[aansluitend: Als student **geen** gesprek heeft gehad met Van Dieren]
<Bestandsnaam; MSJ00114>
[Spreektekst stagebegeleider]
Overigens, ik vind het wel jammer dat je niet van de gelegenheid gebruik gemaakt hebt om met Wouter van Dieren te praten. Die had je als direct betrokkene heel interessante dingen kunnen vertellen. Ik vind echt dat je hiermee een kans gemist hebt. Maar goed, het is nu eenmaal niet meer terug te draaien.....

GALA
Games and Learning Alliance
Network of Excellence for Serious Games

EMERGO: data entry



EMERGO: player



Characteristics EMERGO games – method/toolkit

(black options for Games, grey options can be provided by CELSTEC)

- Web based production and distribution – proven technology
- Data entry
- Webplayer
- Individual and easy to use by authors-teachers (after training)
- Preview option on content + testing
- Scripting: customised learning environment, progress based
- Scripting: learner support, unexpected events
- Multiple characters (case roles)
- Monitoring learners' progress (self, by teachers)
- Easy integration with existing LMS
- Supports Windows Media and Flash video
- Extendible with components (e.g.: multi-role, GoogleMaps, Mobile & GPS [R&D], sensors [R&D])

Agenda Workshop Serious games & EMERGO

10:45 – 10:50 Welcome + getting to know each other

10:50 – 11:15 Task 1 - Evaluation of serious games

11:15 – 11:25 (Serious) games-characteristics and motives(Rob)

11:25 – 11:45 Task 2 – experiencing CSI Heerlen

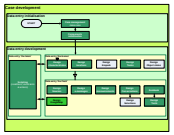
11:45 - 11:55 Developing EMERGO games (Rob)

11:55 – 12:10 Skill-based EMERGO game Sexology (Aad)

12:10 – 12:15 Final discussion and round off (Rob)

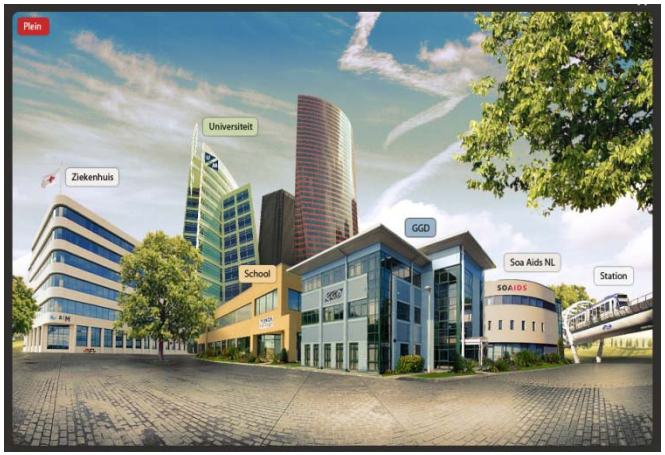




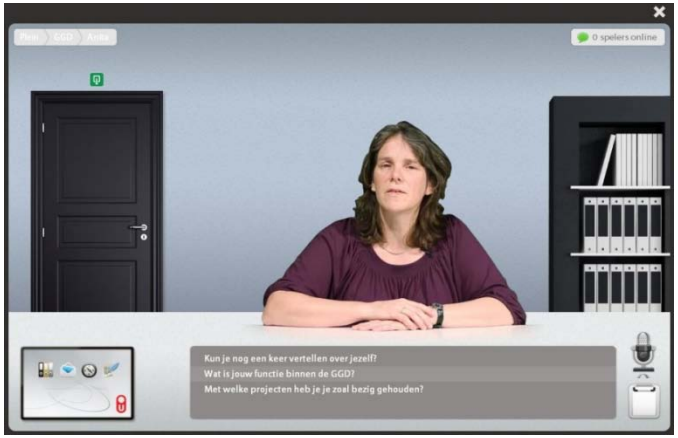





Demo EMERGO example skill-based SG *Sexology*



under development



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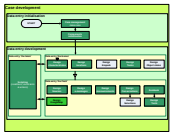


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EMERGO benefits

Can improve teacher bandwidth (monitoring and virtual learner guidance)
Web-based distribution and production - proven technology
Can reduce production and exploitation costs (increased reusability)
Gaming elements, active learning
Collaboration at a distance
Can improve learning
Games without Frills (Games zonder Franje)
Fast and easy to develop by CELSTEC (subject matter by client = YOU!)
(generic) Method for skill-based SG design & development
(generic) extendible Toolkit, (specific) templates (Open Source)
Varied portfolio with clients from: HE/DE, vocational education & training

Conclusion
EMERGO games: How?

- You deliver the content, we can take care for the rest, but…..
- together with you via a controlled and efficient proces to create YOUR EMERGO game!

Discussion - ?questions?

Centre for Learning Sciences and Technologies
celstec.org

Thank you for your attention …

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EMERGO:

www.emergo.cc OR http://portal.ou.nl/web/leren/emergo

GALA:

www.galanoe.eu

Centre for Learning Sciences and Technologies
celstec.org

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